Patent Claims

1. A light-emitting semiconductor component comprising a monolithically produced sequence of semiconductor layers (2), wherein an area of n-doped semiconductor layers (3) and an area of p-doped semiconductor layers (4) follow one another and a first pn junction (5a, 5b) is formed between the areas (3, 4), wherein the first pn junction (5a, 5b) is subdivided into a light-emitting section (7) and a protective-diode section (8) by an insulating section (6), characterized in that
- the insulating section (6) electrically insulates the light-emitting section (7) and the protective-diode section (8) from one another in the area of the p-doped semiconductor layers (4),
- the area of the p-doped semiconductor layers (4) is provided in the protective-diode section (8) on the side facing away from the first pn junction (5b) with an n-doped semiconductor layer (9) which forms a second pn junction (10) with the area of p-doped semiconductor layers (4) in the protective-diode section (8) and is electrically conductively connected to the area of p-doped semiconductor layers (4) in the light-emitting section (7), and
- the first pn junction (5a, 5b) has a larger area in the protective-diode section (8) than in the light-emitting section (7).

2. The light-emitting semiconductor component as claimed in claim 1, characterized in that the area of the first pn junction (5a, 5b) is larger in the protective-diode section (8) than in the light-emitting section (7) by at least a factor of 100.

3. The light-emitting semiconductor component as claimed in claim 1 or 2, characterized in that the sequence of semiconductor layers (2) is applied to a semiconductor substrate (1).

4. The light-emitting semiconductor component as claimed in claim 3, characterized in that a first contact metallization (11) is applied to a side of the semiconductor substrate (1) facing away from the sequence of semiconductor layers (2) and a second contact metallization (12) is applied to part-areas of a surface of the sequence of semiconductor layers (2) opposite to the semiconductor substrate (1).

5. The light-emitting semiconductor component as claimed in one of the preceding claims, characterized in that the area of n-doped semiconductor layers (3) is not interrupted by the insulating section (6) at least in parts.

6. The light-emitting semiconductor component as claimed in claim 3 or as claimed in one of claims 4 or 5, with reference to claim 3, characterized in that the insulating section (6) extends from a surface of the sequence of semiconductor layers (2) opposite to the semiconductor substrate (1) into the area of n-doped layers (3).

7. The light-emitting semiconductor component as claimed in one of the preceding claims, characterized in that the light-emitting section (7) is formed by a vertical cavity surface emitting laser (VCSEL).

8. The light-emitting semiconductor component as claimed in claim 7, characterized in that the first pn junction (5a, 5b) is arranged between a first sequence of Bragg reflector layers and a second sequence of Bragg reflector layers, each of which has a multiplicity of layer pairs, and the two sequences of Bragg reflector layers form a laser resonator, one of the two sequences of the Bragg reflector layers being semitransparent for the laser radiation (18) generated in the pn junction (5a).

9. The light-emitting semiconductor component as claimed in claim 8, characterized in that in one of the two sequences of Bragg reflector layers, at least one current aperture (14) is provided for spatially limiting an operating current flowing through the first pn junction (5a) in the light-emitting section (7) during the operation of the vertical cavity surface emitting laser.

10. The light-emitting semiconductor component as claimed in claim 4 or as claimed in one of claims 5 to 9, with reference to claim 4, characterized in that the second contact metallization (12) partially covers the surface of the light-emitting section in such a manner that an uncovered area remains as light exit opening (17).

11. The light-emitting semiconductor component as claimed in one of the preceding claims, characterized in that the insulating section (6) is constructed as trench (19).

12. The light-emitting semiconductor component as claimed in claim 11, characterized in that the light-emitting section (7) and the protective-diode section (8) have a mesa-shaped structure on the side of the trench (19).

13. The light-emitting semiconductor component as claimed in claim 11 or 12, characterized in that the trench (19) is bounded by areas which are provided with an insulating layer (16).

14. The light-emitting semiconductor component as claimed in claim 13, characterized in that the trench (19) is filled with a material from which the second contact metallization (12) is formed.

15. The light-emitting semiconductor component as claimed in one of claims 1 to 10, characterized in that the insulating section (6) is formed by an implantation, diffusion or oxidation process.

16. The light-emitting semiconductor component as claimed in one of the preceding claims, characterized in that n doping and p doping of the semiconductor layers are exchanged for one another.